

JUL10 Rec'd TO 22 OCT 2001

FORM PTO 1390 (REV. 9-2001)		U.S. DEPARTMENT OF COMMERCE PATENT AND TRADEMARK OFFICE		ATTORNEY'S DOCKET NUMBER 34051	
TRANSMITTAL LETTER TO THE UNITED STATES DESIGNATED/ELECTED OFFICE (DO/EO/US) CONCERNING A FILING UNDER 35 U.S.C. 371				U.S. APPLICATION NO. (If known, see 37 CFR 1.5) 10/030880	
INTERNATIONAL APPLICATION NO. PCT/FR00/01050		INTERNATIONAL FILING DATE 20 April 2000		PRIORITY DATE CLAIMED 23 April 1999	
TITLE OF INVENTION DEVICE FOR OPENING AND DISTRIBUTING A BUNDLE OF FILAMENTS WHEN PRODUCING A NONWOVEN TEXTILE WEB					
APPLICANT(S) FOR DO/EO/US MAGGIO, Rosario; SCHMIT, Laurent					
Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:					
<p>1. <input checked="" type="checkbox"/> This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.</p> <p>2. <input type="checkbox"/> This is a SECOND or SUBSEQUENT submission of items concerning a filing under 35 U.S.C. 371.</p> <p>3. <input type="checkbox"/> This is an express request to begin national examination procedures (35 U.S.C. 371(f)). The submission must include items (5), (6), (9) and (21) indicated below.</p> <p>4. <input checked="" type="checkbox"/> The US has been elected by the expiration of 19 months from the priority date (Article 31).</p> <p>5. <input checked="" type="checkbox"/> A copy of the International Application as filed (35 U.S.C. 371(c)(2))</p> <p>a. <input type="checkbox"/> is attached hereto (required only if not communicated by the International Bureau).</p> <p>b. <input checked="" type="checkbox"/> has been communicated by the International Bureau.</p> <p>c. <input type="checkbox"/> is not required, as the application was filed in the United States Receiving Office (RO/US).</p> <p>6. <input checked="" type="checkbox"/> An English language translation of the International Application as filed (35 U.S.C. 371(c)(2)).</p> <p>a. <input checked="" type="checkbox"/> is attached hereto.</p> <p>b. <input type="checkbox"/> has been previously submitted under 35 U.S.C. 154(d)(4).</p> <p>7. <input checked="" type="checkbox"/> Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))</p> <p>a. <input type="checkbox"/> are attached hereto (required only if not communicated by the International Bureau).</p> <p>b. <input type="checkbox"/> have been communicated by the International Bureau.</p> <p>c. <input type="checkbox"/> have not been made; however, the time limit for making such amendments has NOT expired.</p> <p>d. <input checked="" type="checkbox"/> have not been made and will not be made.</p> <p>8. <input type="checkbox"/> An English language translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).</p> <p>9. <input type="checkbox"/> An oath or declaration of the inventor(s) (35 U.S.C. 371(c)(4)).</p> <p>10. <input type="checkbox"/> An English language translation of the annexes of the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).</p> <p>Items 11 to 20 below concern document(s) or information included:</p> <p>11. <input checked="" type="checkbox"/> An Information Disclosure Statement under 37 CFR 1.97 and 1.98.</p> <p>12. <input type="checkbox"/> An assignment document for recording. A separate cover sheet in compliance with 37 CFR 3.28 and 3.31 is included.</p> <p>13. <input checked="" type="checkbox"/> A FIRST preliminary amendment.</p> <p>14. <input type="checkbox"/> A SECOND or SUBSEQUENT preliminary amendment.</p> <p>15. <input type="checkbox"/> A substitute specification</p> <p>16. <input type="checkbox"/> A change of power of attorney and/or address letter.</p> <p>17. <input type="checkbox"/> A computer-readable form of the sequence listing in accordance with PCT Rule 13ter.2 and 35 U.S.C. 1.821 - 1.825.</p> <p>18. <input type="checkbox"/> A second copy of the published international application under 35 U.S.C. 154(d)(4).</p> <p>19. <input type="checkbox"/> A second copy of the English language translation of the international application under 35 U.S.C. 154(d)(4).</p> <p>20. <input type="checkbox"/> Other items or information.</p>					

page 1 of 2

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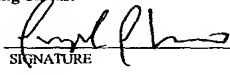
I hereby certify that this correspondence is being deposited with the United States Postal Service "Express Mail Post Office to Addressee" service under 37 CFR 1.10, and is addressed to: Assistant Commissioner for Patents, Washington D.C. 20231 on the date indicated below.

Debra A. Peterlin

Name of Person Mailing Correspondence

10/22/2001
Date

Debra A. Peterlin
Signature of Person
Mailing Correspondence

U.S. APPLICATION NO. 10/030880 <small>(U.S. Patent & Trademark Office Form 100)</small>		INTERNATIONAL APPLICATION NO. PCT/FR00/01050		ATTORNEY'S DOCKET NUMBER 33051	
21. <input checked="" type="checkbox"/> The following fees are submitted: BASIC NATIONAL FEE (37 CFR 1.492 (a) (1) - (5)): Neither international preliminary examination fee (37 CFR 1.482) nor international search fee (37 CFR 1.445(a)(2)) paid to USPTO and International Search Report not prepared by the EPO or JPO \$1040.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but International Search Report prepared by the EPO or JPO \$890.00 International preliminary examination fee (37 CFR 1.482) not paid to USPTO but international search fee (37 CFR 1.445(a)(2)) paid to USPTO \$740.00 International preliminary examination fee (37 CFR 1.482) paid to USPTO but all claims did not satisfy provisions of PCT Article 33(1)-(4) \$710.00 International preliminary examination fee (37 CFR 1.482) paid to USPTO and all claims satisfied provisions of PCT Article 33(1)-(4) \$100.00 ENTER APPROPRIATE BASIC FEE AMOUNT =				CALCULATIONS PTO USE ONLY <div style="border: 1px solid black; padding: 5px; min-height: 100px;"> 890.00 </div>	
Surcharge of \$130.00 for furnishing the oath or declaration later than <input type="checkbox"/> 20 <input checked="" type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(e)).				\$ 890.00 \$ 130.00	
CLAIMS	NUMBER FILED	NUMBER EXTRA	RATE	\$	
Total claims	- 20 =		x \$18.00		
Independent claims	- 3 =		x \$84.00		
MULTIPLE DEPENDENT CLAIM(S) (if applicable)			+ \$280.00		
TOTAL OF ABOVE CALCULATIONS =				\$ 1020.00	
<input type="checkbox"/> Applicant claims small entity status. See 37 CFR 1.27. The fees indicated above are reduced by 1/2.				+	
SUBTOTAL =				\$ 1020.00	
Processing fee of \$130.00 for furnishing the English translation later than <input type="checkbox"/> 20 <input type="checkbox"/> 30 months from the earliest claimed priority date (37 CFR 1.492(f)).				+	
TOTAL NATIONAL FEE =				\$ 1020.00	
Fee for recording the enclosed assignment (37 CFR 1.21(h)). The assignment must be accompanied by an appropriate cover sheet (37 CFR 3.28, 3.31). \$40.00 per property +					
TOTAL FEES ENCLOSED =				\$ 1020.00	
				Amount to be refunded: \$	
				charged: \$	
a. <input checked="" type="checkbox"/> A check in the amount of \$ <u>1,020.00</u> to cover the above fees is enclosed b. <input type="checkbox"/> Please charge my Deposit Account No. _____ in the amount of \$ _____ to cover the above fees. A duplicate copy of this sheet is enclosed. c. <input checked="" type="checkbox"/> The Commissioner is hereby authorized to charge any additional fees which may be required, or credit any overpayment to Deposit Account No. <u>16-0820</u> . A duplicate copy of this sheet is enclosed. d. <input type="checkbox"/> Fees are to be charged to a credit card. WARNING: Information on this form may become public. Credit card information should not be included on this form. Provide credit card information and authorization on PTO-2038.					
NOTE: Where an appropriate time limit under 37 CFR 1.494 or 1.495 has not been met, a petition to revive (37 CFR 1.137 (a) or (b)) must be filed and granted to restore the application to pending status.					
SEND ALL CORRESPONDENCE TO Joseph J. Corso, Esq. Pearne & Gordon LLP 526 Superior Avenue East Suite 1200 Cleveland, Ohio 44114-1484			<div style="text-align: center;">  SIGNATURE </div> <div style="text-align: center;"> Joseph J. Corso NAME 25848 REGISTRATION NUMBER </div>		

107030880
531 Rec'd PCT. 22 OCT 2001
PATENT

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Rosario Maggio et al.
Title: DEVICE FOR OPENING AND DISTRIBUTING A
BUNDLE OF FILAMENTS WHEN PRODUCING A
NONWOVEN TEXTILE WEB
Docket No.: 34051

PRELIMINARY AMENDMENT

Assistant Commissioner for Patents
Washington, D.C. 20231

Sir:

Prior to the examination of the above-identified patent application, it is requested that the following amendments be made.

IN THE CLAIMS:

Please cancel claims 1- 4 without prejudice.

Please add the following claims 5 - 11.

1 5. (new) A device for opening and distributing a
2 bundle of drawn filaments to be formed into a nonwoven
3 textile web deposited on a movable receiving belt, said
4 device comprising an assembly through which said
5 filaments pass before being deposited on the receiving
6 belt, said bundle of drawn filaments being disposed in a
7 curtain configuration and having a bundle width, said
8 assembly including a diffuser having an inlet zone formed
9 by a convergent nozzle extending along the entire bundle
10 width for receiving filaments, a divergent nozzle

11 connected to said convergent nozzle for receiving
12 filaments from the latter, and a rail for
13 electrostatically charging said filaments before they are
14 deposited on said receiving belt.

1 6. (new) A device according to claim 5, wherein
2 said convergent nozzle is connected to said divergent
3 nozzle by a rectilinear slot and said rail is mounted
4 within said rectilinear slot immediately upstream of said
5 divergent nozzle.

1 7. (new) A device according to claim 5, wherein
2 said bundle of filaments is emitted from a drawing slot
3 positioned upstream of said inlet zone and an intake flow
4 of air is provided at the inlet zone by a venturi effect
5 produced in the divergent nozzle by air passing
6 therethrough with said filaments.

1 8. (new) A device according to claim 7, wherein air
2 is injected into said diffuser and passes from said
3 diffuser through said divergent nozzle.

1 9. (new) A device according to claim 5, wherein
2 said convergent nozzle includes a pair of converging
3 walls and said divergent nozzle includes a pair of
4 diverging walls.

[illegible]

1 10. (new) A device according to claim 6, wherein
2 said bundle of filaments is emitted from a drawing slot
3 positioned upstream of said inlet zone and an intake flow
4 of air is provided at the inlet zone by a venturi effect
5 produced in the divergent nozzle by air passing
6 therethrough with said filaments.

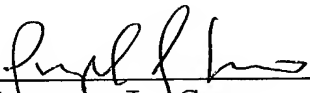
1 11. (new) A device according to claim 10, wherein
2 air is injected into said diffuser and passes from said
3 diffuser through said divergent nozzle.

REMARKS

Attached hereto is a page entitled "VERSION WITH
MARKINGS TO SHOW CHANGES MADE".

If there are any further fees required by this
amendment not covered by an enclosed check, or if no
check is enclosed, please charge the same to Deposit
Account No. 16-0820, Order No. 34051.

Respectfully submitted,

By: 
Joseph J. Corso, Reg. No. 25845

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Suite 1200
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October 22, 2001

10/030880

531 Rec'd PCT/PTO 22 OCT 2001

VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE CLAIMS:

Claims 1 - 4 have been cancelled.

Claims 5 - 11 have been added and, therefore, no
marked up version is required.

531 Rec'd PCT/FTC 22 OCT 2001

DEVICE FOR OPENING AND DISTRIBUTING A BUNDLE OF FILAMENTS
DURING THE PRODUCTION OF A NONWOVEN TEXTILE WEB

Technical field

5 The invention relates to an improvement made to the installations for making a nonwoven textile web, which is commonly referred to by the generic name of spunbond and which is formed by continuous synthetic filaments.

10 It concerns more particularly an improvement made to
the means for distributing the extruded filaments, after
drawing, over a movable transporting belt, over which they
are randomly distributed so as to form a regular web, with
a weight and thickness which can be adjusted according to
15 the applications.

Prior art

The production of nonwoven webs of the spunbond type goes back decades and consist, generally speaking:

- 20 - in extruding a melted organic polymer through a spinneret perforated with holes, so as to form a bundle or curtain of filaments;
- then, in orienting the extruded filaments by drawing by means of one or more fluid-jet, in particular compressed-air, devices,
- 25 - and finally, in receiving the bundle of filaments in the form of a web on a movable transporting belt, which is generally subjected to a suction source and the speed of which is adjusted
- 30 according to the characteristics of the web, in particular thickness, which it is desired to achieve.

After production, the web is consolidated, for example
35 by performing a sizing or calendering, preferably hot
calendering, so that the elementary filaments are joined to
one another.

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In such installations, the filaments emerge at the outlet of the drawing slot in the form of a bundle of filaments grouped together in the mid-plane of the said slot. •

These filaments are ejected at very high speed from the said drawing slot, a speed which can reach 3000 m/min or more depending on the state.

In order to obtain a nonwoven web as homogeneous as possible on the receiving belt onto which the filaments leaving the drawing slot are projected, it is necessary not

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Now, it has been found, and this forms the subject of the invention, that it was possible to achieve not only a

perfect opening of the bundle of extruded filaments at the outlet of the drawing slot, but also a very homogeneous distribution over the receiving belt, on the one hand by separating the assembly for opening the bundle of filaments from the actual drawing slot, and on the other hand and above all, by designing this opening assembly such that it combines both the advantages of the techniques of electrostatically charging the filaments and the techniques of opening the bundle by slowing down the air speed at the drawing-slot outlet, and thus the speed of the filaments before reception on the receiving belt.

Generally speaking, the invention thus relates to a device for opening and distributing a bundle of filaments during the production of a nonwoven textile web, according to the technique which consists:

- in extruding a melted organic polymer through a spinneret perforated with holes, so as to form a bundle or curtain of filaments;
- then, in orienting the extruded filaments by drawing by means of one or more fluid-jet devices;
- and finally, in receiving the bundle of filaments in the form of a web on a movable transporting belt below which is arranged a suction source.

The device for opening and distributing the bundle of filaments according to the invention consists of an assembly arranged downstream of the outlet of the drawing assembly and separated therefrom, this assembly comprising, arranged closed to the outlet of the drawing slot, a diffuser comprising an inlet zone in the form of a convergent nozzle extending over the entire width of the installation opposite the outlet of the drawing slot for producing the web, extended by a divergent nozzle, the said assembly being associated with a rail electrostatically

charging the filaments before they are received on the receiving belt.

According to one embodiment, the divergent zone of the diffuser comprises two walls and two lateral slots situated at the top of the said diffuser, on each side thereof, and permitting either an indraught of air from outside owing to the venturi effect, or, where appropriate, an injection of air under a pressure less than one bar and advantageously between 0.4 and 0.8 bar, bringing about an air flow against the walls of the said diffuser.

The above diffuser makes it possible to precisely adjust the width of the bundle of fibres and also the impact speed of the filaments on the receiving belt, the electrostatic charging assembly being able to be situated, where appropriate, downstream of the diffuser assembly, but preferably being integrated inside the latter, thereby accentuating the opening of the bundle of filaments.

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Advantageously and in practice:

- the diffuser comprises an inlet zone in the form of a convergent nozzle connected to the two walls of the divergent zone by a rectilinear slot, the rail electrostatically charging the filaments being mounted at the level of the rectilinear slot immediately upstream of the divergent zone;
- the distance of the diffuser from the receiving belt is adjustable, in order to minimise the influence of the outside air currents on the bundle of fibres;
- the pressure of the air which flows in the diffuser against the walls thereof and the adjustment of the voltage applied in the electrostatic rail makes it possible to adapt very precisely the conditions of the formation of the sheet according to the speed of the filaments

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Generally speaking, as can be seen from Figure 1, such an installation is thus composed essentially of at least one extruder, designated by the general reference (1), which feeds synthetic polymer, such as polyamide, polyethylene, polyester, etc., to a spinneret (2) for the formation of a curtain of filaments. (3)

From a practical point of view, by way of guidance, the spinneret consists of a plate each containing a multitude of holes, for example 5000 per metre of width and having a diameter depending on the extruded filaments, for example of 0.5 mm. These holes are distributed over a plurality of parallel rows, for example over eighteen rows, and over a width at the spinneret outlet of 140 mm.

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At the outlet of the drawing assembly (5), the bundle of filaments (3) is projected onto the receiving belt (7) by way of an assembly (6), which assembly forms the subject of the invention and the two embodiments of which can be seen in Figures 2 and 3, and which causes the air flow leaving the slot (5) to deviate and slow down, thus bringing about the opening of the bundle of filaments.

25 In this embodiment, the diffuser assembly (10) is composed essentially of a chamber (12) having an inner slot (13) in the form of a convergent/divergent nozzle extending over the entire width of the installation opposite the outlet of the drawing slot (F) of the assembly (5).

Opening into this slot (13), close to the lower part of the divergent zone, are two laterally arranged symmetrical slots (14). These symmetrical slots (14) may be either connected to a source of compressed air injected under a pressure less than 1 bar and advantageously of the order of 0.4 bar, or be simply open to the outside air.

The divergent zone is, in this embodiment, extended by two walls (15) which are likewise divergent.

Arranged immediately downstream of this diffuser assembly, or where appropriate integrated inside the latter, is a conventional rail (11) for electrostatically charging the filaments, thus making it possible to intensify the opening of the bundle. Such a rail (1) is a conventional rail, for example of the type described in US-A-3 967 118.

Figure 3 illustrates a second embodiment of an assembly for opening and distributing a bundle of filaments in the form of a web produced in accordance with the invention.

In this variant, using the same references as those employed to describe the example illustrated by Figure 2, the device for opening and distributing the bundle of filaments (6) is, as before, separated from the drawing assembly (5).

This embodiment also comprises an inlet zone (13) in the form of a convergent nozzle extending opposite the outlet of the drawing slot (F). This inlet zone (13) in the form of a convergent nozzle is connected to the two walls (15) of the divergent zone by a rectilinear slot (20).

The rail (11) for electrostatically charging the filaments is, in this embodiment, integrated inside the diffuser, at the end of the rectilinear slot (20) immediately upstream of the divergent zone (15).

An indraught of air coming from outside owing to the venturi effect is produced through the two adjacent lateral slots formed by the lower face of the drawing assembly (5)

Of course, the invention is not limited to such an embodiment, but covers any variants thereof realised in the same spirit.

CLAIMS

1. Device for opening and distributing a bundle of filaments during the production of a nonwoven textile web, according to the technique which consists:

- in extruding a melted organic polymer through a spinneret perforated with holes, so as to form a bundle or curtain of filaments;
- then, in orienting the extruded filaments by drawing by means of one or more fluid-jet devices (5);
- and finally, in receiving the bundle of filaments in the form of a web on a movable receiving belt below which is arranged a suction source,

characterised in that it consists of an assembly (6) arranged downstream of the outlet of the drawing assembly (5) and separated therefrom, the said assembly comprising, arranged close to the outlet of the drawing slot (F), a diffuser (10) comprising an inlet zone (13) in the form of a convergent nozzle extending over the entire width of the installation opposite the outlet of the drawing slot (F) for producing the web, extended by a divergent nozzle (15), the said assembly being associated with a rail (11) electrostatically charging the filaments before they are received on the receiving belt (7).

2. Device according to Claim 1, characterised in that the diffuser (10) comprises an inlet zone (13) in the form of a convergent nozzle connected to the two walls (15) of the divergent zone by a rectilinear slot (20), the rail (11) electrostatically charging the filaments being mounted at the level of the rectilinear slot immediately upstream of the divergent zone (15).

3. Device according to one of Claims 1 and 2, characterised in that an indraught of air owing to the venturi effect is produced between the faces opposite the

$\frac{1}{2} \cdot \frac{1}{2} = \frac{1}{4}$

The invention concerns a device for opening and distributing a bundle of filaments when producing a nonwoven textile web by a technique which consists in : extruding melted organic polymer through a die perforated with holes, so as to form a bundle or curtain of filaments; then directing the extruded filaments by drawing by means of one or several fluid jets ; and finally, receiving the bundle of filaments in the form of a web on a mobile conveyor belt. The invention is characterised in that it consists of an assembly arranged downstream of the outlet of the drawing assembly and separate therefrom, said assembly comprising, arranged in the proximity of the drawing slot outlet, a diffuser comprising an intake zone shaped as a convergent nozzle extending over the whole width of the installation opposite the drawing slot outlet producing the web, extended by a divergent nozzle, said assembly being associated with a ramp electrostatically charging the filaments before they are received on the receiving belt.

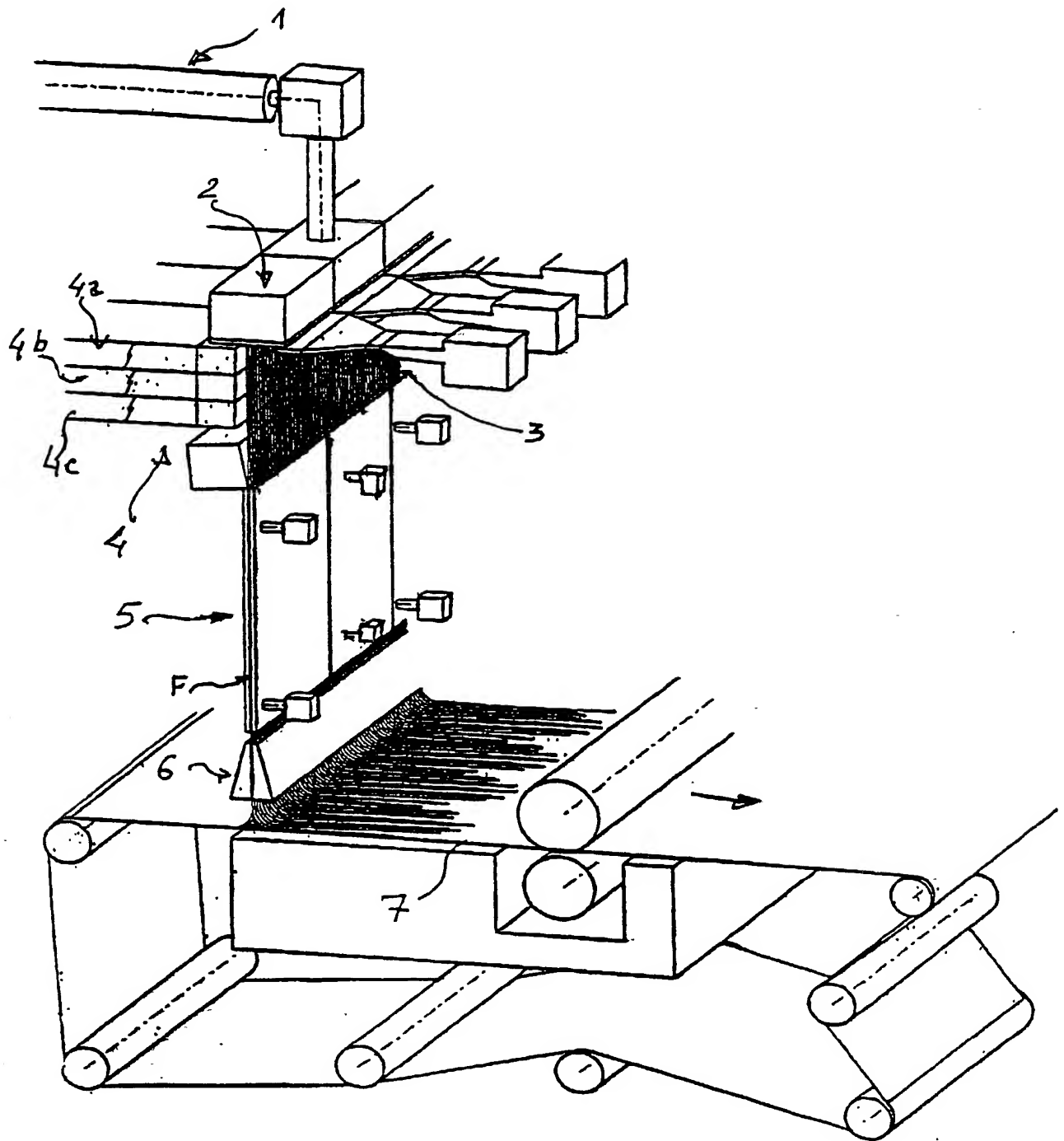


FIG.1

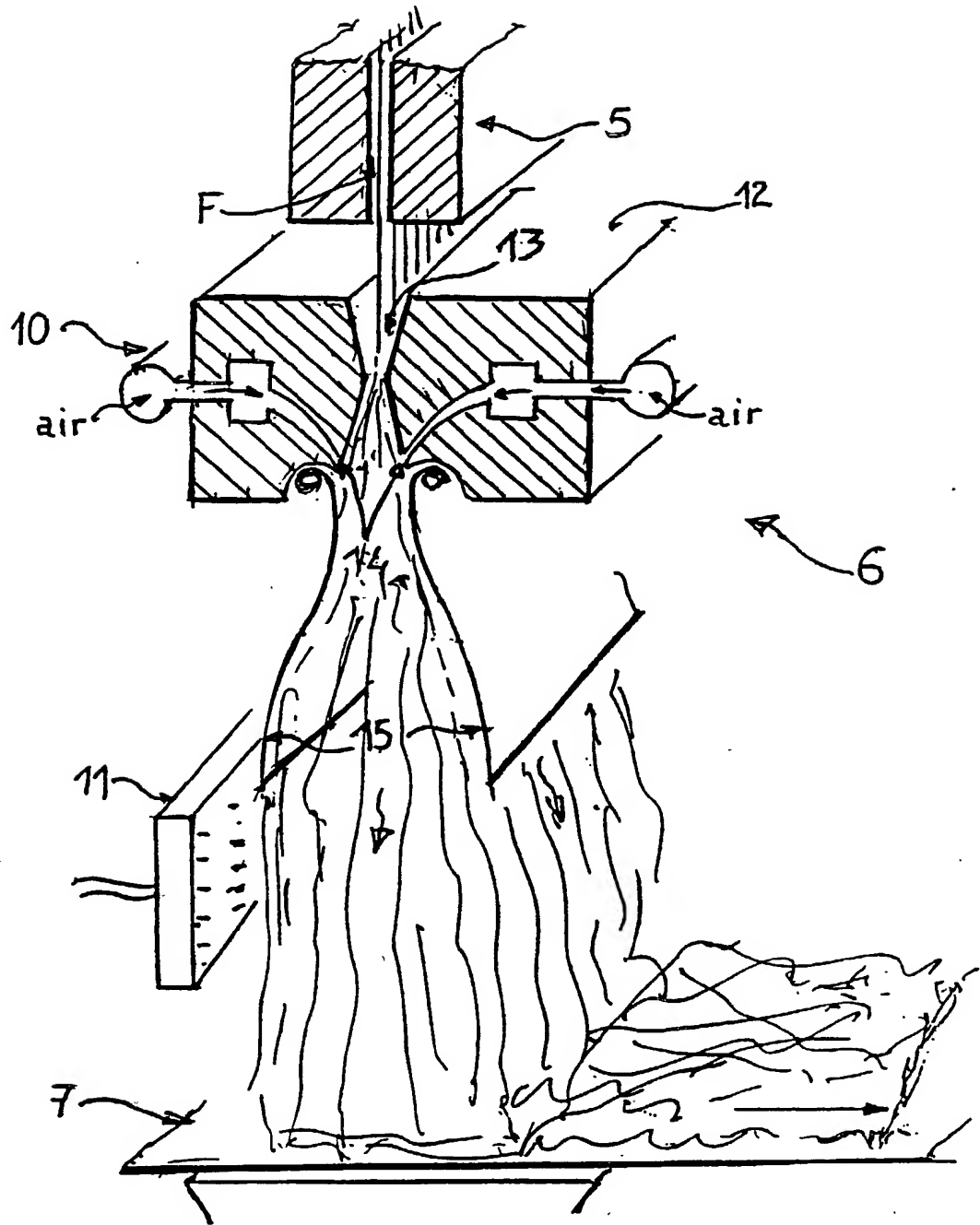
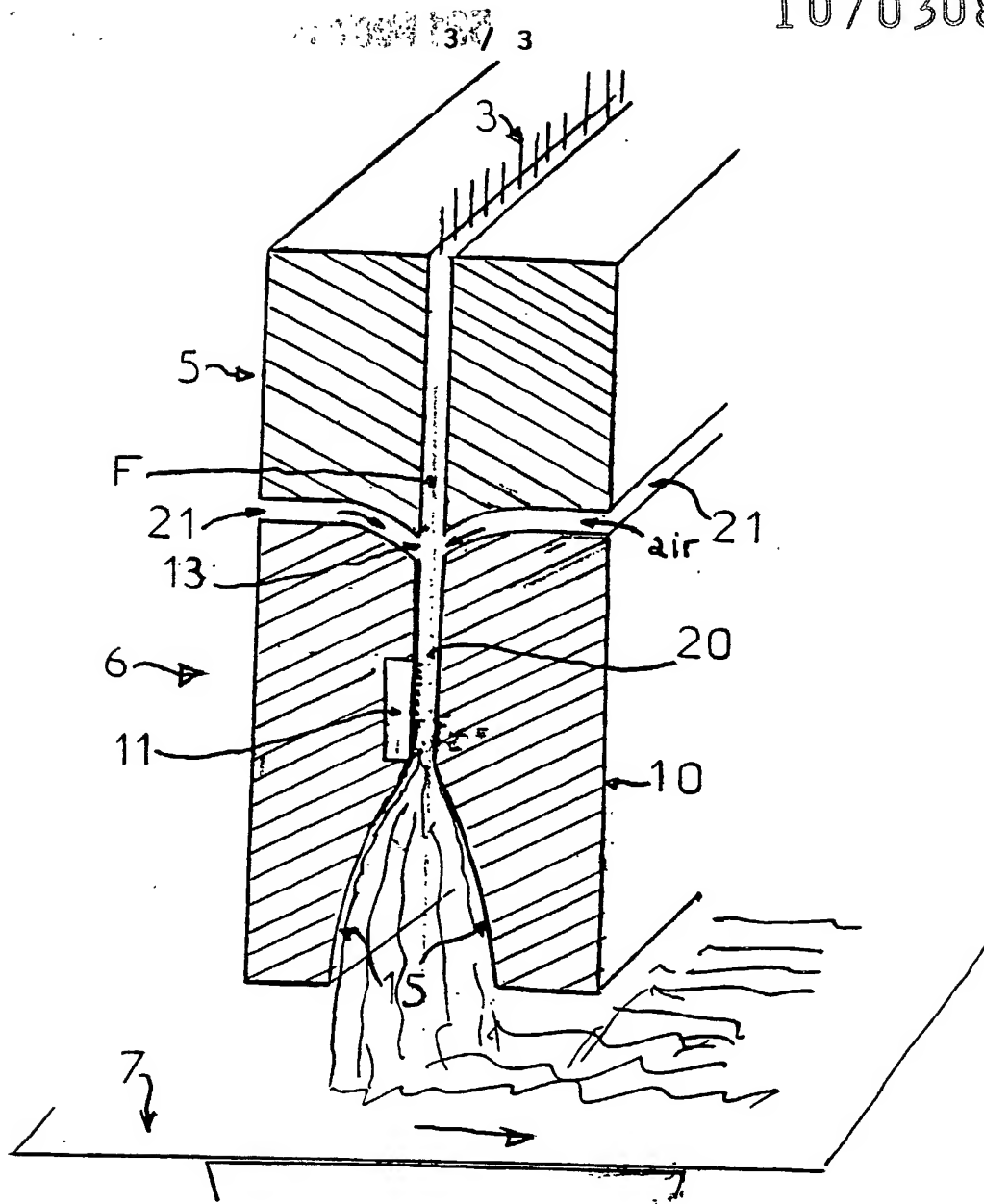


FIG. 2



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(Control No. 000116)

and appoint each of the following as my attorneys with full power of substitution and revocation, to prosecute this application and to transact all business in the Patent and Trademark Office connected therewith:

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I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

(1) Inventor (~~sole or~~ joint):

Citizenship: ~~French~~ Italian

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Maggio, Rosario

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